WHAT IS CLAIMED IS

1. A mass-analyzing method using an ion trap type mass spectrometer which is equipped with a ring electrode and one pair of end cap electrodes and temporarily traps ions in a three-dimensional quadrupole field to mass-analyze a sample, comprising

a first step of applying a main high frequency voltage to said ring electrode to form a three-dimensional quadrupole field,

a second step of generating ions in a mass analyzing unit or injecting ions from the outside and trapping ions of a predetermined mass-to-charge ratio range in said mass analyzing unit,

a third step of applying a supplementary AC voltage having a plurality of frequency components between said end cap electrodes and scanning the frequency components of said supplementary AC voltage, and

a fourth step of scanning said main high frequency voltage and ejecting ions from said mass analyzing unit and detecting thereof.

2. A mass-analyzing method using an ion trap type mass spectrometer which is equipped with a ring electrode and one pair of end cap electrodes and temporarily traps ions in a three-dimensional

quadrupole field to mass-analyze a sample, comprising

a first step of applying a main high frequency voltage to said ring electrode to form a three-dimensional quadrupole field,

a second step of generating ions in a mass analyzing unit or injecting ions from the outside and trapping ions of a predetermined mass-to-charge ratio range in said mass analyzing unit,

a third step of applying a supplementary AC voltage having a plurality of frequency components between said end cap electrodes and scanning said main high frequency voltage,

a fourth step of scanning said main high frequency voltage and ejecting ions from said mass analyzing unit and detecting thereof.

3. A mass-analyzing method in accordance with claims 1 and 2, wherein said supplementary AC voltage has a predetermined frequency band ($\omega 1$ to $\omega 2$).

4. A mass-analyzing method in accordance with claim 1, wherein the voltage (V1) of any frequency component of said supplementary AC voltage is at least high enough to eject ions in resonance and the voltage (V2) of the other frequency component is high enough to excite ions in resonance but not high enough to eject ions in resonance.

5. A mass-analyzing method in accordance with claim 4, wherein the low frequency component of said supplementary AC voltage has said voltage value V1.

6. A mass-analyzing method in accordance with claim 5, wherein said supplementary AC voltage in said third step is frequency-swept from low frequency to high frequency.

7. A mass-analyzing method in accordance with claim 5, wherein a step is provided between said second step and said third step to apply a wide-band noise signal to said end cap electrodes to exclude ions of a high-mass region.

8. A mass-analyzing method in accordance with claim 6, wherein the frequency and voltage of said supplementary AC voltage in said third step are fixed and said main high frequency voltage is swept from high voltage to low voltage.

9. A mass-analyzing method in accordance with claim 5, wherein a step is provided between said second step and said third step to apply a wide-band noise signal to said end cap electrodes to exclude ions of a low-mass region.

10. A mass-analyzing method in accordance with claim 9, wherein the higher frequency component of said supplementary AC voltage has said voltage value

V1.

11. A mass-analyzing method in accordance with claim 10, wherein the voltage of said main high frequency voltage in said third step is fixed and said supplementary AC voltage is frequency-swept from high frequency to low frequency.

12. An ion trap type mass spectrometer comprising a mass analyzing unit having a ring electrode and one pair of end cap electrodes, a detecting unit for detecting ions ejected from said mass analyzing unit, and a control unit for controlling a voltage applied to said mass analyzing unit, wherein said control unit applies a main high frequency voltage to said ring electrode, forms a three-dimensional quadrupole field, and applies a supplementary AC voltage having a plurality of voltage components between said end cap electrodes while ions are trapped in said mass analyzing unit.

13. An ion trap type mass spectrometer in accordance with claim 12,

wherein said supplementary AC voltage has a predetermined frequency band ($\omega 1$ to $\omega 2$),

wherein the voltage (V1) of any frequency component of said supplementary AC voltage is at least high enough to eject ions in resonance and

wherein the voltage (V2) of the other frequency component is high enough to excite ions in resonance but not high enough to eject ions in resonance.

14. An ion trap type mass spectrometer in accordance with claim 13, wherein said voltage V2 is set to be higher than the voltage of a frequency component of said voltage V1 and lower than the voltage of an opposite frequency

15. An ion trap type mass spectrometer in accordance with claim 13, wherein the frequency component having said voltage V2 is discontinuous.

16. An ion trap type mass spectrometer comprising a mass analyzing unit forming an ion trap volume with a ring electrode and one pair of end cap electrodes, a detecting unit for detecting ions ejected from said mass analyzing unit, and a control unit for controlling a voltage applied to said mass analyzing unit, wherein, among ions trapped in said ion trap volume, singly-charged ions are selectively ejected out of the ion trap volume.

17. An ion trap type mass spectrometer in accordance with claim 16, wherein a supplementary AC voltage comprising a frequency component having a plurality of voltage values is applied to said end cap electrodes to scan.